COSSOR

EQUIPMENT MANUAL

COSSOR ELECTRONICS LIMITED

COSSOR

OSCILLOSCOPE CDU 130

ISSUE 2

incorporating AL1

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CDU 130 Oscilloscope

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CDU 130 OSCILLOSCOPE

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CDU 130 OSCILLOSCOPE

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CDU 130 OSCILLOSCOPE

SECTION 1

INTRODUCTION

The CDU 130 is a transistorised portable oscilloscope weighing only 16½ lb (7.5 kg) with internal batteries. It operates from a wide range of external AC or DC supplies or, alternatively, can be operated for a period of five hours on internal batteries. A self-contained battery charger is included which recharges the batteries in 14 hours when full charge is used, and a trickle charge is obtained when the oscilloscope is being operated from external supplies. Protection against reverse charging of the internal batteries is also provided.

Silicon Planar transistors are used to ensure reliability and Field Effect transistors reduce 'Y' amplifier drift, eliminate microphony and ensure accuracy at slow T/B sweep speeds. Stabilization against temperature and input voltage changes gives an accuracy of ± 3%, X and Y.

OSCILLOSCOPE CDU130

SECTION 2

DATA SUMMARY AND CHARACTERISTICS

1. VERTICAL DEFLECTION

Single Channel Sensitivity	5mV/div. to 20V/div. in 12 calibrated steps of 5, 10, 20 & 50mV and 0.1, 0.2, 0.5V, 1, 2, 5, 10 and 20V. Continuous variation of sensitivity throughout the range to 50V/cm is provided by a VAR GAIN control.
Bandwidth	D.C. to 15 MHz min. (3dB) at all sensitivities.
Rise Time	25nS
Attenuator Accuracy	± 3%
Input Impedance	1MΩ, shunted by 40pF
Input Coupling	A.C. or D.C.
Maximum Input Voltage	Maximum permissible input voltage ± 350V peak
Input Capacitor Rating	600V

2. HORIZONTAL DEFLECTION

Timebase Sweep Range	Extends from 0.5µS/div. to 0.2 sec/div. in 18 calibrated steps with a 1-2-5 sequence. Accuracy ± 3% on all ranges. Uncalibrated sweep rates are continously variable by greater than 2.5:1.

X5 Magnification	Increases all sweep speeds by a factor of 5. Overall timebase accuracy is ± 3% with magnifier in use, except on fastest sweep of 100nS/div. when accuracy is ± 5%.
Trigger Source	Internal or External
Trigger Sensitivity	Internal - 0.4 div. up to 5MHz, 1 div. up to 20 MHz. External - 0.4V up to 4MHz, 1V up to 20MHz.
Trigger Slope	Internal: positive or negative, variable over whole screen by means of TRIGGER LEVEL control. External: variable over range ± 10 Volts.

External Trigger

Input Impedance	100kΩ, shunted by 10pF
Trigger Coupling	A.C. or D.C.
Maximum Input Voltage	± 200V peak (D.C. coupled). Input capacitor rating 600 Volts.
X Amplifier	Bandwidth of D.C. to 1MHz min. Sensitivity approx. 1.25V/div. increased by X5 magnifier to 0.25V/div.
Input Impedance	100kΩ, shunted by 10pF.
Maximum Input Voltage	± 100V peak.

3. GENERAL

Cathode Ray Tube	A 3in single gun, PDA tube with 1.6kV accelerating potential. Graticule scaled 6 x 10 div. of ¼in, externally illuminated.

Intensity Modulation	A.C. coupled (2kΩ and 0.1μF). 10V p-p is required to modulate the trace.
Calibrator	Nominal 5kHz square wave, Amplitude 250mV p-p. Accuracy ± 2%.

Power Requirements

External Supply	95V to 135V or 190V to 270V AC supply, no tap changer necessary, 48-440 Hz, approx. 20VA; or 11.5V to 35V D.C. in one range, approx. 700mA.
Internal Battery	10 size 'D' rechargeable NiCd cells having approx. 5 hours life.
Internal Battery Charger	Full or Trickle charge. Trickle charge occurs while instrument is operating from mains or more than 25V from external battery.

Size and Weight

Dimensions	Width	Height	Depth
	8⅓in (21.6cm)	8in (20.3cm)	14⅓in (36.8cm)

Weight without Internal battery	14 lb (6.4kg)
Weight with Internal battery	16½lb (7.5kg)
Environmental	Operation temperatures -10°C to + 40°C. Storage -26°C to +55°C.

SECTION 3

OPERATION AND DESCRIPTION OF CONTROLS

The controls are simple to use and, as far as possible, self-explanatory.

OPERATION

1. To Obtain a Stable Display

   (a) Connect instrument to the mains supply and set POWER switch to ON EXT. SUPPLY.

   (b) Set front panel controls as follows:

SWEEP TIME/DIV	:	0.1mS
X5 MAGNIFIER	:	OFF
TRIG — FREE RUN Switch	:	FREE RUN
TRIGGER SOURCE	:	INT
TRIGGER COUPLING	:	AC
TRIGGER SLOPE	:	+
SENSITIVITY V/DIV	:	50mV
VERTICAL INPUT COUPLING	:	AC
VAR GAIN	:	CAL

   (c) Turn BRILL control fully clockwise.

   (d) Rotate POSITION controls to centre the trace.

   (e) Set FOCUS and BRILL controls to obtain a well defined display.

   (f) Adjust the preset BAL control so that rotation of VAR GAIN control has no effect on the trace.

   (g) Apply 250mV Calibrator output to the vertical input socket.

   (h) Set TRIG — FREE RUN to TRIG position and obtain a stable display by adjusting the TRIGGER LEVEL control.

   (i) Adjust the preset GAIN control to give 5 divisions of square wave.

2. Internal Triggering

   (a) Rotate HORIZONTAL POSITION control until the first half-cycle of the waveform is visible. It is positive going.

   (b) Insert a 1MΩ resistor between the calibrator output lead and the vertical input socket.

(c) Set SENSITIVITY/DIV to 10mV and SWEEP TIME/DIV to 20µS.

(d) Adjust VAR GAIN control and VERTICAL POSITION control until the waveform is approx. 8 div. in amplitude and central on screen.

(e) Operate LEVEL control, noting that the sweep can be made to start at any point of the positive slope of the waveform within the graticule area.

(f) Set SLOPE switch to -ve.

(g) Rotate LEVEL control, noting that any point on the negative slope may be selected as the trigger point.

(h) Set LEVEL control so that the trigger point is on the vertical centre line.

(i) Operate VERTICAL POSITION control, noting that the LEVEL determines the trigger point on the waveform independent of POSITION.

(j) Set TRIGGER COUPLING switch to DC and operate VERTICAL POSITION and LEVEL controls. Note that LEVEL determines the vertical trigger point on the screen independent of where the waveform is positioned.

3. External Triggering

Apply trigger signal to trigger input socket with the TRIGGER SOURCE switch at EXT and operate LEVEL, COUPLING and SLOPE switches as in para.2. If this signal is greater than 400mV peak to peak it triggers the timebase. When viewing fast transient waveforms, trigger externally from a pre-pulse to enable whole waveforms to be seen.

4. 'X' Amplifier

(a) Set SWEEP TIME/DIV switch to X amp.

(b) Apply signal to be displayed to X AMP input socket.

(c) Pull out the X5 magnifier to expand the horizontal deflection, if required.

(d) Centre the display with the HORIZONTAL POSITION control.

SECTION 4

CALIBRATION

TEST EQUIPMENT REQUIRED.

1. The following items of test equipment of their equivalent are required to complete setting up and calibration.

Constant Amplitude Signal Generator, e.g. Tektronix 190
75Ω Termination (BNC)
Avometer Model 8
75Ω 20dB Attenuator
General Purpose Oscilloscope, 5mV sensitivity
Resistance 10kΩ
Capacitance Meter, e.g. Tektronix LC meter 130
Cossor Square Wave Generator 1090
Test Leads
Time Mark Generator, e.g. Tektronix 180
Voltage Calibrator 1 kHz 25mV to 100V
BNC Shorting Plug
BNC T Adaptor
Insulated Trimming Tool
Regulated Power Supply 10-20V, 1A

NOTE: Unless otherwise stated, all voltages are to be measured with respect to earth.

TESTS

2. Power Supplies

2.1 External Supply Operation

(a) Ensure that the voltage selector switch on back panel is in the 230V position and that 'Z mod' link is in position.

(b) Check that correct fuses have been inserted in the back panel sockets and remove the 1 amp fuse. Remove the convertor box.

(c) Turn the POWER switch on front panel to EXT position and connect 240V mains supply. Check that MAINS neon lights.

(d) Insert 1 amp fuse and turn Trip Potentiometer RV602 fully anti clockwise.

(e) Connect voltmeter between pins 13 (+ve) and 10(-ve) on P.C.B. 'A' and check that it reads between 11V and 26V.

(f) Connect voltmeter between pin 12 (-ve) and pin 13 (+ve) on P.C.B. 'A' and adjust RV601 to give 9.7V on meter.

(g) Remove mains plug, insert convertor unit and reconnect mains. Check that SCOPE ON neon lights. Voltage on meter should drop to not less than 9.4V. Re-adjust RV601 to give 9.7V.

(h) Measure the voltages as shown in Table 1.

TABLE 1

TEST POINT	TEST INSTRUMENT	LIMITS Min.	Max.	REMARKS
Junction R715 & C707	Avometer	+9.5V to +10.0V		P.C.B. 'A'
Junction R716 & C708	''	-9.8V to -10-3V		''
Junction R718 & C710	''	+49V to +54V		''
Junction R717 & C709	''	-48V to -53V		''
Junction R34 & R25	''	+9.6V to +10.1V		P.C.B. 'B'
Junction R48 & C8	''	-9.7V to -10.2V		''
Junction R44 & C7	''	+49V to +54V		''
SKT3 Pin 4 (-ve)	''	-330V to -407V		
Between SKT 3 Pin 3 (-ve) & SKT 3 Pin 4 (+ve)	''	-94V to -114V		
SKT4 Pin 1 (+ve)	''	+1000V to +1200V		
Between Pins 12 & 13 (earth) P.C.B. 'A'	General Purpose Oscilloscope X1 Probe (a.c. coupled)	10mV		Measuring Oscilloscope:- Triggered on Line. Sweep Rate/ div.10mSecs. Measure 100c/s onl

2.2 Battery Operation

(a) Insert fully charged batteries into battery tubes. Set POWER switch to ON INT. BATTERY. Check that SCOPE ON neon lights and that the voltage between pin 12(-ve) and pin 13 (+ve) reads 9.6V to 9.75V on Avometer.

(b) Switch to TRICKLE CHG position. Remove battery cover and disconnect centre battery cap. Connect Avometer, set to 100mA D.C. range, between centre contact on battery (-ve) and contact on +ve cap. The reading must be between 45mA and 55mA.

(c) Change Avo to 1A D.C. range and switch to FULL CHG. The reading must be between 310mA and 390mA.

(d) Change over Avo clips and switch to ON INT. BATTERY. The reading must not be greater than 800mA.

(e) Replace battery cap, disconnect mains and switch to ON EXT. SUPPLY Connect an external supply to the correct polarity of the Ext. Supply socket on the back panel. Connect Avo, set to 25V D.C. range, across pin 13 (+ve) and pin 10 (-ve).

(f) Adjust power supply until 10.4V is indicated. Connect -ve lead of Avo to pin 12. Rotate RV602 in a clockwise direction until reading falls to 9.6V.

3. Brilliance Range

(a) Set controls to the following positions:

RV402	- Approx. midway
Brilliance control	- Fully clockwise
T.B. switch	- X Amp.
RV903	- Fully anti-clockwise
Horizontal Position	- Approx. midway
Vertical Position	- Approx. midway
DC Balance	- Approx. midway
Sensitivity	- 20V/div.
Trig. Free Run switch	- Trig.
RV902	- Fully anti-clockwise
Variable Sweep	- Cal.
Trig. Source	- Ext.
Trig. Coupling	- AC
Level	- Fully anti-clockwise
RV703	- Fully clockwise

(b) Bring spot to centre of screen by adjusting coarse DC Balance control RV2.

(c) Decrease brilliance of spot by means of Brilliance control and RV402. Adjust Focus and preset Astig controls to obtain a round, well focussed spot.

(d) Switch Sweep Rate to 5mS/div. Using Avo, set RV 901 to give +1.2V reading on 10V range at the junction of MR107 and MR106. Set HORIZONTAL POSITION control fully clockwise.

(e) Turn Brilliance fully clockwise. Adjust RV402 until the spot is just visible under normal lightimg conditions. Set T.B. switch to X-Amp.

4. Mean Plate Potentials

(a) Bring spot to centre of screen using HORIZONTAL POSITION control. Return Brilliance to a reasonable level.

(b) Set Balance until there is no movement of spot when VAR. GAIN control is rotated.

(c) Place Avo, on 100V DC range, across Pins 25 (+ve) and 26 (-ve), P.C.B. 'B' and obtain a zero reading by adjustment of the VERTICAL POSITION control Measure mean plate potential on Pin 25 and note voltage obtained. Limit: 28V-34V

(d) Zero the voltage between Pin 26,(+ve) and pin 27 (-ve), P.C.B. 'A'. adjusting the HORIZONTAL POSITION control, and measure mean plate potential on pin 26, noting voltage obtained. Limit: 18V -22V.

(e) Measure voltages at junctions of R19 and R12(+ve), limit 5V-6V; and junction of R25 and R26 (+ve), limit: 5.8V-7.0V.

5. Trace Alignment

(a) Set Oscilloscope controls as follows:-

TRIGGER—FREE RUN Switch	- FREE RUN
T.B. Switch	- 1mS/div
MAGNIFIER	- X5

(b) A horizontal trace of not less then 10 major divisions should be displayed. Adjust Focus for optimum resolution.

(c) Slacken C.R.T. clamp screw and, using lever on clamp, rotate the C.R.T. until trace is horizontal. Tighten clamp screw.

6. Calibrator

Clip a 10k ohm resistor with crocodile clip ends between Pin 1, P.C.B. 'A' and earth. Connect voltmeter to CAL socket on front panel and adjust RV204 to give 250mV. Disconnect 10k resistor.

NOTE: A digital voltmeter should be used if greater accuracy is required.

7. Geometry

(a) Set Sensitivity to 20mV/div. T.B. switch to 10μS/div.

(b) Inject internal calibrator into 'Y' input socket. Adjust VERTICAL POSITION and VAR. GAIN controls to give two lines approx. 3 divisions above and below the 'Y' centre line. Set RV405 so that both lines are straight and parallel to within $\frac{1}{2}$ a minor division. Disconnect Calibrator.

8. Trigger Balance

(a) Set TRIG — FREE RUN switch to TRIG.

(b) Connect Avo, set to 2.5V range. to junction MR109 and R901 (+ve). Rotate RV903 clockwise until sweep starts. Carefully rotate RV903 anti-clockwise until sweep just stops. Increase voltage on Avo by 0.1V by rotating RV903 anti-clockwise.

(c) Connect Avo on 10V DC range to junction of R215 and MR208 (+ve). Adjust LEVEL control until switching slope switch has no effect on the meter. Adjust trig. slope bal. control RV203 so that meter reads +1.0V on 2.5V DC range. Re-adjust LEVEL control and RV203 until +1.0V is obtained on both positions of slope switch. Remove meter from test point.

(d) Set TRIGGER SOURCE to INT., SENSITIVITY to 0.5V/div., SWEEP TIME to 0.1mS/div. TRIG — FREE RUN switch to FREE RUN. Rotate HORIZONTAL POSITION control clockwise until the start of sweep is visible. Apply 50kc/s to 'Y' input socket and adjust amplitude of input signal to give 2 divisions deflection. Switch to TRIG. and adjust LEVEL control until a stable waveform is displayed with start of sweep vertically centred on waveform. Adjust VERTICAL POSITION control until start of sweep coincides with the horizontal centre line. Switch TRIGGER SOURCE to D.C. Adjust RV201 until start of sweep again coincides with horizontal centre line.

9. 'Y' Amplifier Gain

(a) Set oscilloscope controls as follows:

Sensitivity	:	5mV/div.
'Y' Coupling	:	D.C.
Sweep Time	:	2mS/div.

TRIGGER SLOPE	:	+ve
TRIGGER SOURCE	:	AC
VAR. GAIN	:	CAL

(b) Apply 25mV from external voltage calibrator to 'Y' input. Adjust front panel preset gain control to give 5 divisions of square wave.

(c) Set SENSITIVITY to 5mV/div. and inject 50mV from calibrator. Turn VAR. GAIN fully anti-clockwise. The resultant deflection must not be greater than 4 div. Reset to CAL.

10. Attenuator

Attenuator trimmers are adjusted in sequence as shown in Table 2. 1kc/s Calibrator is applied to input socket; on some ranges the appropriate trimmer is adjusted for a square corner on a positive going wave. Capacitance meter is applied to input socket on other ranges and indicated trimmer is adjusted to give 40pF reading in each case.

TABLE 2

SENSITIVITY/DIV.	CALIBRATOR INPUT	CAPACITANCE METER	TRIMMER
5mV		40pF	C1
10mV	50mV		C102
20mV	0.1V		C104
50mV	0.25V		C106
.5V	2.5V		C109
.5V	25V		C112
.5V		40pF	C111
.5V		40pF	C108
50mV		40pF	C105
20mV		40pF	C103
10mV		40pF	C101

11. Calibration of TB and 'X' Amplifier

(a) Set controls as follows:

MAGNIFIER	:	X1
Sweep Time/div	:	50μS
TRIGGER SOURCE	:	INT.
TRIGGER FREE RUN	:	FREE RUN

Set Sweep length preset RV902 to give approx. 10 divisions deflection, centring sweep with HORIZONTAL POSITION control.

(b) Switch to TRIG. and inject time-mark generator, set to give 50µS marks, into 'Y' input. Adjust Trig. level and sensitivity as necessary. Set RV702 to show 8 marks against the centre 8 division on graticule. Re-focus if necessary and take care to avoid parallax error.

(c) Re-adjust sweep length RV902 to give approx.10 divisions and re-check calibration.

(d) Apply 10µS markers to 'Y' input and set MAG. switch to X5. Adjust RV703 to give 8 marks against the centre 8 division on graticule.

(e) Set Sweep Time/div. to 1µS, inject 1µS marker into 'Y' channel and set MAG. switch to X1. Adjust C816 to give 8 marks against the centre 8 division on graticule.

(f) Carry out procedure detailed in Table 4 and check error obtained in each case. Error being measured over the centre 8 division.

TABLE 4

Sweep Time/div.	Marker Input	Display Interval	Remarks
0.2S	100mS	2 per div	
0.1S	100mS	1 per div	
50mS	100mS	1 per 2 div	
20mS	10mS	2 per div	
10mS	10mS	1 per div	
5mS	10mS	1 per 2 div	If necessary
2mS	1mS	2 per div	average error
1mS	1mS	1 per div	by adjusting
0.5mS	1mS	1 per 2 div	RV702
0.2mS	100µS	2 per div	
0.1mS	100µS	1 per div	
50µS	100µS		
20µS	10µS	1 per 2 div	
10µS	10µS	2 per div	
5µS	10µS	1 per div	
2µS	1µS	1 per 2 div	Average error
1µS	1µS	2 per div	by adjusting
0.5µS	1µS	1 per 2 div	C816

Limit: ±3% on each of the 20 readings

(g) Set Sweep Time/cm to 0.5μS and pull out the X1 X5 MAG. switch. Inject 10MHz sinewave from time mark generator. Check error obtained over 8 divisions. Set MAG switch to X1. Limit: ± 5%.

(h) Sweep Time/div. should now be set to 0.5μS/div. with TRIG — FREE RUN switch on FREE RUN. Adjust RV902 to give 10½ div trace length.

12. 'X'-Amp. Gain and Bandwidth

(a) Switch Sweep Time/div. switch to 'X' Amplifier and inject 5V into 'X' Amplifier input from calibrator. Deflection on screen should be between 3.5 and 4.5. divs, and between 3.5 and 4.5 divs. with 1 volt injected and X1 X5 switch pulled out.

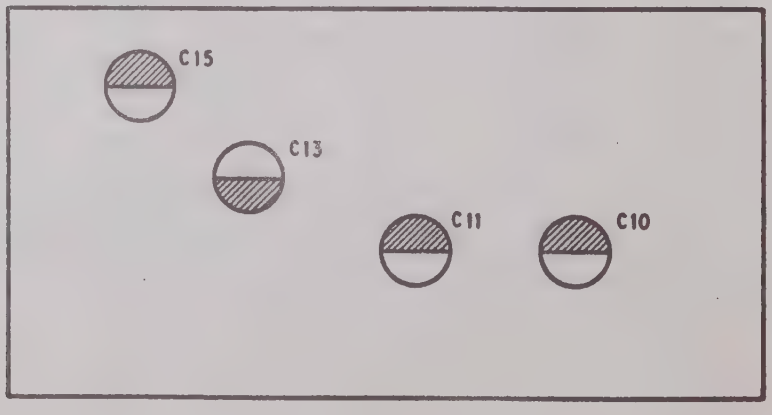
(b) Inject 350kc/s into X-Amp input from Constant Amplitude Signal Generator terminated by 75 Ω and adjust output to obtain 8 divisions deflection. Ascertain the frequency at which the displayed line falls to 5.6 div. This frequency must not be less than 1MHz.

13. Y Amplifier Compensation

(a) Set Oscilloscope controls as follows:-

SWEEP TIME/DIV.	-	0.5μS/div
X1 X5 Mag. Switch	-	In
TRIG — FREE RUN	-	TRIG.
TRIGGER COUPLING	-	AC
SLOPE	-	+ve
Y Channel SENSITIVITY	-	5mV/div.
VAR. GAIN	-	fully anticlockwise
Y Coupling switch	-	AC

and set trimmers on P.C.B. 'B' as shown below. The shaded section represents the silver on the adjustment end.



(b) Inject output from Cossor 1090 Square Wave Generator via 75Ω 20dB attenuator into Y Channel. Set 1090 Amplitude control to give 5 divisions deflection. Adjust Frequency control to give approx. two complete cycles across the screen.

(c) Adjust C13 to extend straight line portion of the pulse towards the corner without losing the smoothness of the positive-going edge and without overshoot.

(d) Similarly adjust C11 to improve the sharpness of the corner without overshoot.

(e) Return VAR. GAIN to its CAL. position and re-set amplitude from 1090 to again give 5 divisions deflection. Adjust C10 to obtain the same results as in (d).

(f) Set Sweep Time/div. to 5μS/div. Adjust C15 to obtain a flat top on +ve part of waveform.

(g) Remove 1090 input and inject 350kc/s from Tektronix Constant Amplitude Signal Generator via a 75Ω 20dB pad. With Sweep Time/div. set to 0.1mS/div. adjust output of signal generator to give 5 divisions deflection. Ascertain and note the frequency at which the deflection falls to 3.5 divisions.

Limit: 15MHz to 20MHz.

(h) Should the frequency be less than 15MHz repeat (e) adjusting C10 to increase the corner sharpness slightly. Repeat (g).

(i) If the frequency is greater than 20MHz repeat (e) adjusting C10 to decrease the corner sharpness slightly. Repeat (g).

Limit: The final pulse response shape obtained must have an overshoot not greater than one tenth of one division.

14. Trigger Sensitivity

(a) Set oscilloscope controls as follows:

SWEEP TIME/DIV	:	0.1mS/div.
SENSITIVITY V/DIV	:	0.1V/div.
TRIGGER SOURCE	:	EXT
TRIG — FREE RUN switch	:	FREE RUN

(b) Apply 50kc/s from constart amplitude signal generator to both TRIGGER INPUT and Y INPUT using B.N.C. T adaptor. Adjust amplitude to give 3 divisions of Y deflection.

(c) Switch to TRIG. It should be possible to obtain a stable display with adjustment of the LEVEL control.

(d) Set SENSITIVITY to 1V/div. and TRIGGER SOURCE to INT. It should be possible to obtain a stable display with adjustment of the LEVEL control.

(e) Set SENSITIVITY to .2V/div. and SWEEP TIME to .5μS. Increase the frequency of the signal generator to 20MHz. Adjust amplitude to give 1 division of Y deflection.

(f) It should be possible to obtain a stable display with adjustment of the LEVEL control.

(g) Set TRIGGER SOURCE switch to EXT. Adjust signal generator amplitude to give 1V peak-to-peak.

(h) It should be possible to obtain a stable display with adjustment of the LEVEL control.

SECTION 5

CDU 130 OSCILLOSCOPE - COMPONENT LIST

1. Power Regulator (Fig.2)

Cct.	Cossor Ref.	Value	Tolerance ± %	Rating
	Resistors			
R601	IUB3540/95	82k	5	.5W
R602	IUB3540/98	110k	5	.5W
R603	IUB3540/73	10k	5	.5W
R604	IUB3540/25	100Ω	5	.5W
R605	A910655/2	15Ω	5	5W
R606	IUB3540/81	22k	5	.5W
R607	IUB3540/89	47k	5	.5W
R608	IUB3540/67	5.6k	5	.5W
R609	IUB3540/67	5.6k	5	.5W
R610	IUB3540/51	1.2k	5	.5W
R611	IUB3540/51	1.2k	5	.5W
R612	IUB3540/53	1.5k	5	.5W
R613	IUB3540/52	1.3k	5	.5W
R614	IUB3540/29	150Ω	5	.5W
R615	IUB3540/41	470Ω	5	.5W
	Resistors Variable			
RV601	A910656/4	1k		
RV602	A910656/6	4.7k		
	Capacitors			
C600	Not used			
C601	IUB7017/19	2000μF		30V
C602	IVB7017/19	2000μF		30V
C603	B910208/26	160μF		40V
C604	ITB6107/7	0.1μF		250V
C605	ITB7033/26	10μF		16V
C606	ITB6127	0.01μF		100V
	Diodes			
MR600	Not used			
MR601	ISB9082 IN4001			
MR602	ISB9082 IN4001			
MR603	ISB9082 IN4001			

B/SA80439/32 Iss.C.Sht.1
B/SA80439/32 Iss.D.Sht.2
B/SA80439/32 Iss.F.Sht.3
C/SA80349/8 Iss.B
C/SA80439/9 Iss.C.Sht.1

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Diodes			
MR604	ISB9082	IN4001		
MR605	A910099/11	ZF6.8		
MR606	ISB9082	IN4001		
MR607	ISB9082	IN4001		
MR608	ITB9085	IN821		
MR609	A910099/11	ZF6.8		
MR610	ISB9082	IN4001		
MR611	IUB9036	IN914		
MR612	IUB9036	IN914		
MR613	IUB9036	IN914		
MR614	ISB9082	IN4001		
	Transistors			
VT601	IUB9046	U3180/2		
VT602	IUB9046	U3180/2		
VT603	ISB9045	40250		
VT604	B99160/3	2N3055		
VT605	A910648	2N3906		
VT606	A910649	2N3904		
VT607	A910648	2N3906		
T1	Mains Transformer K31630			
FS1	Fuse Miniature ISB5012/500		500mA	
FS2	Fuse Miniature ISB5012/1		1A	
ILP1	Mains ON - Neon LTRE NM2L ISB5045			
ILP2	Scope ON - Neon LTRE NM2L ISB5045			
C01	Thermal Cut-out ISB9603			

B/SA80439/32 Iss.F Sht.3
C/SA80439/8 Iss.B
C/SA80439/9 Iss.C Sht.1
D/SA80439/7 Iss.C Sht.1

CDU 120 OSCILLOSCOPE - COMPONENT LIST

2. Convertor (Fig.2)

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Resistors			
R501	IUB3540/59	2.7k	5	.5W
R502	IUB3540/5	15Ω	5	.5W
R503	IUB3540/5	15Ω	5	.5W
R504	IUB3540/97	100k	5	.5W
R505	IUB3540/97	100k	5	.5W
R506	IUB3540/61	3.3k	5	.5W
R507	IUB3540/105	220k	5	.5W
R508	IUB3540/78	16k	5	.5W
R509	IUB3540/88	43k	5	.5W
R510	IUB3540/73	10k	5	.5W
R511	IUB3540/93	68k	5	.5W
	Capacitors			
C500	Not used			
C501	B910208/17	250µF		16V
C502	ISB6132/2	0.47µF	20	100V
C503	ITB6055/206	100pF	5	125V
C504	ITB6081/24	0.22µF		250V
C505	B910208/29	64µF		64V
C506	B910208/17	250µF		16V
C507	B910208/17	250µF		16V
C508	B910208/29	64µF		64V
C509	ITB6081/22	.033µF		630V
C510	ITB6081/22	.033µF		630V
C511	ITB6081/22	.033		630V
C512	ITB6081/22	.033		630V
C513	ITB6081/23	.033		1000V
C514	ITB6081/22	.033		630V
C515	ITB6081/23	.033		1000V
C516	Not used			
C517	ITB6055/206	100pF	5	125V

B/SA80439/34 Iss.D Sht.1
B/SA80439/34 Iss.F Sht.2

CDU 130 OSCILLOSCOPE - COMPONENT LIST

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Diodes			
MR500				
MR501	A910645 EC402			
MR502	IUB9089 IS920			
MR503	IUB9089 IS920			
MR504	IUB9089 IS920			
MR505	IUB9089 IS920			
MR506	ISB9080 U15857/1			
MR507	ISB9080 U15857/1			
MR508	A910678 BY128			
MR509	ISB9080 U15857/1			
MR510	ISB9080 U15857/1			
MR511	A910678 BY128			
MR512	A910678 BY128			
MR513	A910678 BY128			
MR514	A910678 BY128			
	Transistors			
VT501	IUB9088 U3180/3			
VT502	IUB9088 U3180/3			
VT503	ITB9143/4 ZTX504			
	Inductors			
L1	Cambion 2960-38-2 A910659	6.8µH		
L2	Cambion 2960-38-2 A910659	6.8µH		
T2	Converter Torriod KA31720			

B/SA80439/34 Iss.D Sht.1
B/SA80439/34 Iss.F Sht.2

CDU 130 OSCILLOSCOPE - COMPONENT LIST

3. C.R.T. (Fig.2)

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Resistors			
R401	ITB3514/7AD/82505	8.2M	5	.5W
R402		8.2M	5	.5W
R403	IUB3540/89	47k	5	.5W
R404	IUB3540/119	820k	5	.5W
R405	IUB3540/123	1.2M	5	.5W
R406	IUB3540/57	2.2k	5	.5W
R407	IUB3540/121	1M	5	.5W
	Resistors Variable			
RV401	B910948/9	2.2M		
RV402	A910842/19	2.2M		
RV403	B910948/10	470k		
RV404	B910948/13	22k		
RV405	A910842/4	100k		
	Capacitors			
C401	IUB6129	0.1μF		630V
C402	IUB6129	0.1μF		630V
	Diodes			
MR515	B910086/2 IN916			

B/SA80439/33 Iss.D Sht.2
B/SA80439/30 Iss.F

CDU 130 OSCILLOSCOPE - COMPONENT LIST

4. 'X' Amplifier (Fig.3)

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Resistors			
R700	Not used			
R701	IUB3541/81	22k	5	1W
R702	IUB3540/95	82k	5	.5W
R703	IUB3540/88	43k	5	.5W
R704	IUB3540/93	68k	5	.5W
R705	IUB3540/25	100Ω	5	.5W
R706	IUB3540/89	47k	5	.5W
R707	IUB3540/89	47k	5	.5W
R708	IUB3540/73	10k	5	.5W
R709	IUB3540/73	10k	5	.5W
R710	IUB3540/72	9.1k	5	.5W
R711	IUB3540/72	9.1k	5	.5W
R712	IUB3540/89	47k	5	.5W
R713	IUB3540/89	47k	5	.5W
R714	IUB3540/17	47Ω	5	.5W
R715	IUB3540/1	10Ω	5	.5W
R716	IUB3540/1	10Ω	5	.5W
R717	IUB3540/17	47Ω	5	.5W
R718	IUB3540/17	47Ω	5	.5W
R719	IUB3540/52	1.3k	5	.5W
R720	IUB3540/33	220Ω	5	.5W
R721	IUB3540/53	1.5Ω	5	.5W
R722	IUB3540/86	36k	5	.5W
R723	IUB3540/72	9.1k	5	.5W
R724	IUB3540/25	100Ω	5	.5W
	Resistors Variable			
RV701	B910947/5	10k		
RV702	A910842/3	470Ω		
RV703	A910842/7	100Ω		

B/SA80439/32 Iss.C Sht.1
B/SA80439/32 Iss.D Sht.2
B/SA80439/32 Iss.F Sht.3

CDU 130 OSCILLOSCOPE - COMPONENT LIST

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Capacitors			
C701	ITB6055/15	22pF	1pF	125V
C702	ITB6055/204	15pF	1pF	350V
C703	ITB6055/21	10pF	1pF	125V
C704	ITB6055/45	220pF	5	125V
C705	ITB6055/211	1200pF	5	125V
C706	ITB6107/7	0.1µF		100V
C707	ITB7033/29	80µF		16V
C708	ITB7033/29	80µF		16V
C709	ITB7033/46	10µF		64V
C710	ITB7033/46	10µF		64V
C711	ITB6127	0.01µF		100V
	Diodes			
MR700	Not used			
MR701	IUB9036 IN914			
MR702	IUB9036 IN914			
MR703	IUB9036 IN914			
	Transistors			
VT701	A910649 2N3904			
VT702	A910649 2N3904			
VT703	ISB9087 BF140G			
VT704	ISB9087 BF140G			
VT705	A910649 2N3904			

B/SA80439/32 Iss.D Sht.2
B/SA80439/32 Iss.F Sht.3
B/SA80439/32 Iss.B Sht.4

CDU 130 OSCILLOSCOPE - COMPONENT LIST

5. Timebase (Fig.3)

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Resistors			
R900	Not used			
R901	IUB3540/61	3.3k	5	.5W
R902	IUB3540/63	3.9k	5	.5W
R903	IUB3540/41	470Ω	5	.5W
R904	IUB3540/97	100k	5	.5W
R905	IUB3540/43	560Ω	5	.5W
R906	IUB3540/57	2.2k	5	.5W
R907	IUB3540/83	27k	5	.5W
R908	IUB3540/83	27k	5	.5W
R909	IUB3540/99	120k	5	.5W
R910	IUB3540/99	120k	5	.5W
R911	IUB3540/57	2.2k	5	.5W
R912	IUB3540/61	3.3k	5	.5W
R913	IUB3540/81	22k	5	.5W
R914	IUB3540/25	100Ω	5	.5W
R915	IUB3540/49	1k	5	.5W
R916	IUB3540/65	4.7k	5	.5W
R917	IUB3540/49	1k	5	.5W
R918	IUB3540/83	27k	5	.5W
R919	IUB3540/89	47k	5	.5W
R920	IUB3540/65	4.7k	5	.5W
R921	IUB3540/73	10k	5	.5W
R922	IUB3540/77	15k	5	.5W
R923	IUB3540/81	22k	5	.5W
R924	IUB3540/49	1k	5	.5W
R925	IUB3540/60	3k	5	.5W
	Resistors Variable			
RV901	A910656/6	4.7k		
RV902	A910656/7	10k		
RV903	A910656/6	4.7k		

B/SA80439/32 Iss.C Sht.1
B/SA80439/32 Iss.D Sht.2

CDU 130 OSCILLOSCOPE - COMPONENT LIST

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Capacitors			
C900	Not used			
C901	ITB6055/209	33pF	1pF	125V
C902	ITB6055/206	100pF	5	125V
C903	ITB6055/41	18pF	1pF	125V
C904	ITB6055/41	18pF	1pF	125V
C905	Not used			
C906	ITB6127	0.01µF		
C907	ITB6055/41	18pF	1pF	125V
C908	ITB6127	0.01µF		
C909	ITB6055/206	100pF	5	125V
	Transistors			
VT101	A910649 2N3904			
VT102	A910649 2N3904			
VT103	IBB9097 2N3819			
VT104	A910649 2N3904			
VT105	A910649 2N3904			
VT106	A910649 2N3904			
VT107	A910649 2N3904			

B/SA80439/32 Iss.D Sht.2
B/SA80439/32 Iss.F Sht.3

CDU 130 OSCILLOSCOPE - COMPONENT LIST

6. Timebase Switch (Fig.3)

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Resistors			
R801	ITB3512/2HS2/5M/01	5M	1	
R802	ITB3512/2HS2/2.5M/01	2.5M	1	
R803	ITB3512/2HS2/1.5M/01	1.5M	1	
R804	ITB3512/2HS2/500k/01	500k	1	
R805	ITB3512/2HS2/250k/01	250k	1	
R806	ITB3512/2HS2/250k/01	250k	1	
	Resistors Variable			
RV801	ITB8084	25k		
	Capacitors			
C800	Not used			
C801	IVB6111/59	1µF		
C802	ITB6046/21	0.1µF		
C803	ITB6046/22	0.01µF		
C804	ITB6046/23	.001µF		
C805	ITB6055/208	82pF	5	125V
C806	Not used			
C807	Not used			
C808	Not used			
C809	Not used			
C810	Not used			
C811	A910668	7µF	+50-20	20V
C812	IVB6111/51	0.47µF	20	
C813	ITB6046/6	0.047µF	20	
C814	ITB6046/25	4700pF	20	
C815	ITB6046/26	470pF	20	
C816	IUB6530/6	4-20pF		

B/SA80439/6 Iss.C Sht.1

CDU 130 OSCILLOSCOPE - COMPONENT LIST

7. 'Y' Amplifier (Fig.4)

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Resistors			
R1	ITB3512/2HS2/1M/01	1M	1	
R2	IUB3540/121	1M	5	.5W
R3	IUB3540/9	22Ω	5	.5W
R4	IUB3540/71	8.2k	5	.5W
R5	IUB3540/69	6.8k	5	.5W
R7	IUB3540/61	3.3k	5	.5W
R8	IUB3540/89	47k	5	.5W
R9	IUB3540/63	3.9k	5	.5W
R10	IUB3540/69	6.8k	5	.5W
R11	IUB3540/41	470Ω	5	.5W
R12	IUB3540/46	750Ω	5	.5W
R13	IUB3540/73	10k	5	.5W
R14	IUB3540/1	10Ω	5	.5W
R15	IUB3540/1	10Ω	5	.5W
R16	IUB3540/31	180Ω	5	.5W
R17	IUB3540/73	10k	5	.5W
R18	IUB3540/46	750Ω	5	.5W
R19	IUB3540/37	330Ω	5	.5W
R20	IUB3540/39	390Ω	5	.5W
R21	IUB3540/81	22k	5	.5W
R22	IUB3540/81	22k	5	.5W
R23	IUB3540/61	3.3k	5	.5W
R24	IUB3540/61	3.3k	5	.5W
R25	IUB3540/52	1.3k	5	.5W
R26	IUB3540/41	470Ω	5	.5W
R27	IUB3540/32	200Ω	5	.5W
R28	IUB3540/73	10k	5	.5W
R29	Not used			
R30	IUB3540/51	1.2k	5	.5W

B/SA80439/33 Iss.E Sht.1

CDU 130 OSCILLOSCOPE - COMPONENT LIST

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Resistors			
R31	IUB3540/1	10Ω	5	.5W
R32	IUB3540/73	10k	5	.5W
R33	IUB3540/41	470Ω	5	.5W
R34	IUB3540/1	10Ω	5	.5W
R35	IUB3540/59	2.7k	5	.5W
R36	IUB3540/25	100Ω	5	.5W
R37	IUB3540/17	47Ω	5	.5W
R38	IUB3540/31	180Ω	5	.5W
R39	IUB3540/45	680Ω	5	.5W
R40	IUB3540/45	680Ω	5	.5W
R41	IUB3540/25	100Ω	5	.5W
R42	IUB3540/17	47Ω	5	.5W
R43	IUB3540/59	2.7k	5	.5W
R44	IUB3540/1	10Ω	5	.5W
R45	IUB3540/79	18k	5	.5W
R46	IUB3540/21	68Ω	5	.5W
R47	IUB3540/65	4.7k	5	.5W
R48	IUB3540/1	10Ω	5	.5W
R49	IUB3540/77	15k	5	.5W
R50	IUB3540/25	100Ω	5	.5W
SIL	ITB3551/5 Silistor	270Ω		
	Resistors Variable			
RV1	B910948/5	47k		
RV2	A910842/2	4.7k		
RV3	B910947/3	47k		
RV4	B910948/6	470Ω		
RV125	B910948/7	470Ω		
	Capacitors			
C1	IUB6525/2 Trimmer	2-6pF		
C2	ITB6046/18	4700pF		630V
C3	ITB6127	0.01μF		100V
C4	ITB7033/26	10μF		16V
C5	ITB7033/26	10μF		16V

B/SA80439/33 Iss.D Sht.2
B/SA80439/41 Iss.A

CDU 130 OSCILLOSCOPE - COMPONENT LIST

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Capacitors			
C6	ITB7033/29	80µF		16V
C7	ITB7033/46	10µF		64V
C8	ITB7033/29	80µF		16V
C9	ITB6055/21	10pF	1pF	125V
C10	IUB6525 Trimmer	10-40pF		
C11	IUB6525 Trimmer	10-40pF		
C12	Not used			
C13	IUB6525 Trimmer	10-40pF		
C14	ITB6055/26	150pF	5	125V
C15	IUB6525 Trimmer	10-40pF		
C16	ITB7033/26	10µF		16V
	Diodes			
MR1	A910645 EC402			
MR2	A910645 EC402			
MR3	IUB9036 IN914			
MR4	IUB9036 IN914			
MR5	ITB9085 IN821			
MR6	IUB9036 IN914			
MR7	IUB9036 IN914			
MR8	ITB9085/2 IN823			
	Transistors			
VT1	ICB9098/1 BFW11 (selected)			
VT2	A910649 2N3904			
VT3	A910649 2N3904			
VT4	A910649 2N3904			
VT5	A910649 2N3904			
VT6	A910649 2N3904			
VT7	A910649 2N3904			
VT8	A910649 2N3904			
VT9	A910649 2N3904			
VT10	A910649 2N3904			
VT11	A910649 2N3904			
VT12	A910649 2N3904			
VT13	A910649 2N3904			

B/SA80439/33 Iss.D Sht.2
B/SA80439/33 Iss.G Sht.3

CDU 130 OSCILLOSCOPE - COMPONENT LIST

8. Attenuator Switch (Fig.4)

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Resistors			
R100	IUB3540/1	10Ω	5	.5W
R101	ITB3505/C21/500k/01	500k	1	.25W
R102	ITB3505/C21/1M/01	1M	1	.25W
R103	ITB3505/C21/750k/01	750k	1	.25W
R104	ITB3505/C21/333k/01	333k	1	.25W
R105	ITB3505/C21/900k/01	900k	1	.25W
R106	ITB3505/C21/111k/01	111k	1	.25W
R107	IUB3540/1	10Ω	5	.5W
R108	ITB3505/C21/990k/01	990k	1	.25W
R109	ITB3505/C21/10.1k/01	10.1k	1	.25W
R110	ITB3505/C21/1M/01	1M	1	.25W
R111	ITB3505/C21/1k/01	1k	1	.25W
	Capacitors			
C101	IUB6525/1 Trimmer	4-20pF		
C102	IUB6525 Trimmer	10-40pF		
C103	IUB6525/1 Trimmer	4-20pF		
C104	IUB6525/1 Trimmer	4-20pF		
C105	IUB6525 Trimmer	10-40pF		
C106	IUB6525/2 Trimmer	2-6pF		630V
C107	IUB6129	0.1µF		
C108	IUB6525 Trimmer	10-40pF		
C109	IUB6525/2 Trimmer	2-6pF		
C110	IUB6130	270pF		350V
C111	IUB6525 Trimmer	10-40pF		
C112	IUB6525/2 Trimmer	2-6pF		
C113	IUB6130/2	2700pF		200V
	Diodes			
MR101	IUB9036 IN914			
MR102	IUB9036 IN914			
MR103	IUB9036 IN914			
MR104	IUB9036 IN914			

B/SA80439/7 Iss.C Sht.1
C/SA80439/37 Iss.C
C/SA80439/38 Iss.B
C/SA80439/42 Iss.D

CDU 130 OSCILLOSCOPE - COMPONENT LIST

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Diodes			
MR105	A910645 EC402			
MR106	IUB9036 IN914			
MR107	A910099/11 ZF6.8			
MR108	IUB9036 IN914			
MR109	IUB9036 IN914			
MR110	IUB9036 IN914			
MR111	IUB9036 IN914			

CDU 130 OSCILLOSCOPE - COMPONENT LIST

9. Trigger and Calibrator (Fig.4)

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Resistors			
R201	IUB3540/81	22k	5	.5W
R202	IUB3540/60	3k	5	.5W
R203	IUB3540/60	3k	5	.5W
R204	IUB3540/61	3.3k	5	.5W
R205	IUB3540/73	10k	5	.5W
R206	IUB3540/9	22Ω	5	.5W
R207	IUB3541/97	100k	5	1W
R208	IUB3540/85	33k	5	.5W
R209	IUB3540/65	4.7k	5	.5W
R210	IUB3540/95	82k	5	.5W
R211	IUB3540/73	10k	5	.5W
R214	IUB3540/45	680Ω	5	.5W
R215	IUB3540/61	3.3k	5	.5W
R216	IUB3540/41	470Ω	5	.5W
R217	IUB3540/45	680Ω	5	.5W
R218	IUB3540/57	2.2k	5	.5W
R219	IUB3540/29	150Ω	5	.5W
R220	ITB3512/2HS2/6.5k/01	6.5k	1	.25W
R221	ITB3512/2HS2/180Ω/01	180Ω	1	.25W
R222	IUB3540/45	680Ω	5	.5W
R223	IUB3540/17	47Ω	5	.5W
	Resistors Variable			
RV201	A910842/5	1k		
RV202	B910948/14	22k		
RV203	A910656/6	4.7k		
RV204	A910656/4	1k		
	Capacitors			
C200				
C201	IUB6129	0.1μF		630V
C202	ITB6055/204	15pF	1pF	350V
C203	ITB6127	0.01μF		100V
C204	ITB6127	0.01μF		100V

D/SA80439/7 Iss.C Sht.1
B/SA80439/33 Iss.D Sht.2
B/SA80439/32 Iss.C.Sht.1
B/SA80439/32 Iss.D Sht.2

CDU 130 OSCILLOSCOPE - COMPONENT LIST

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Capacitors			
C205	ITB6127	0.01µF		100V
C206	ITB6127	0.01µF		100V
C207	ITB6055/205	47pF	5	125V
C208	ITB6055/209	33pF	1pF	125V
	Diodes			
MR200	Not used			
MR201	IUB9036 IN914			
MR202	IUB9036 IN914			
MR203	IUB9036 IN914			
MR204	IUB9036 IN914			
MR205	IUB9036 IN914			
MR206	IUB9036 IN914			
MR207	IUB9036 IN914			
MR208	A910099/9 ZF5.6			
MR209	A910099/6 ZF4.3			
MR210	IUB9036 IN914			
	Transistors			
VT201	A910649 2N3904			
VT202	A910649 2N3904			
VT203	A910648 2N3906			
VT204	A910648 2N3906			
VT205	A910649 2N3904			
VT206	A910649 2N3904			
VT207	A910649 2N3904			
VT208	A910549 2N3904			
VT209	A910649 2N3904			

B/SA80439/33 Iss.D Sht.2
B/SA80439/32 Iss.F Sht.3

CDU 130 OSCILLOSCOPE - COMPONENT LIST

10. General

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Switches			
S1	Time-base	B50439/60		
S2	Double-pile change-over	ITB4034		
S3	Attenuator			
S4	Slide switch 2-pole index	ISB4038		
S5	Double-pole change-over	ITB4034		
S6	Double-pole change-over	ITB4034		
S7	Double-pole change-over	ITB4034		
S8	Double-pole change-over	ITB4034		
S9	Ardente Miniature S1450/4/B800/A	A910661		
S10	Double-pole change-over	ITB4034		
CRT	Telefunken D7-17GH	B910495		
	Plugs			
PL3	McMurdo PP10	WB2615/8		
PL4	McMurdo PP10	WB2615/8		
	Sockets			
SKT1	Belling Lee L1436/5	A910505		
SKT2	Bulgin P360SE	A910817		
SKT3	McMurdo PS10	IUB2615/9		
SKT4	McMurdo PS10	IUB2615/9		
SKT7	Greenpar	ISB2617		
SKT8	Greenpar	ISB2617		

D/SA80439/7 Iss.C Sht.1
C/SA80439/9 Iss.C Sht.1
B/SA80439/34 Iss.D Sht.1
D/GA80439 Iss.C Sht.3

CDU 130 OSCILLOSCOPE - COMPONENT LIST

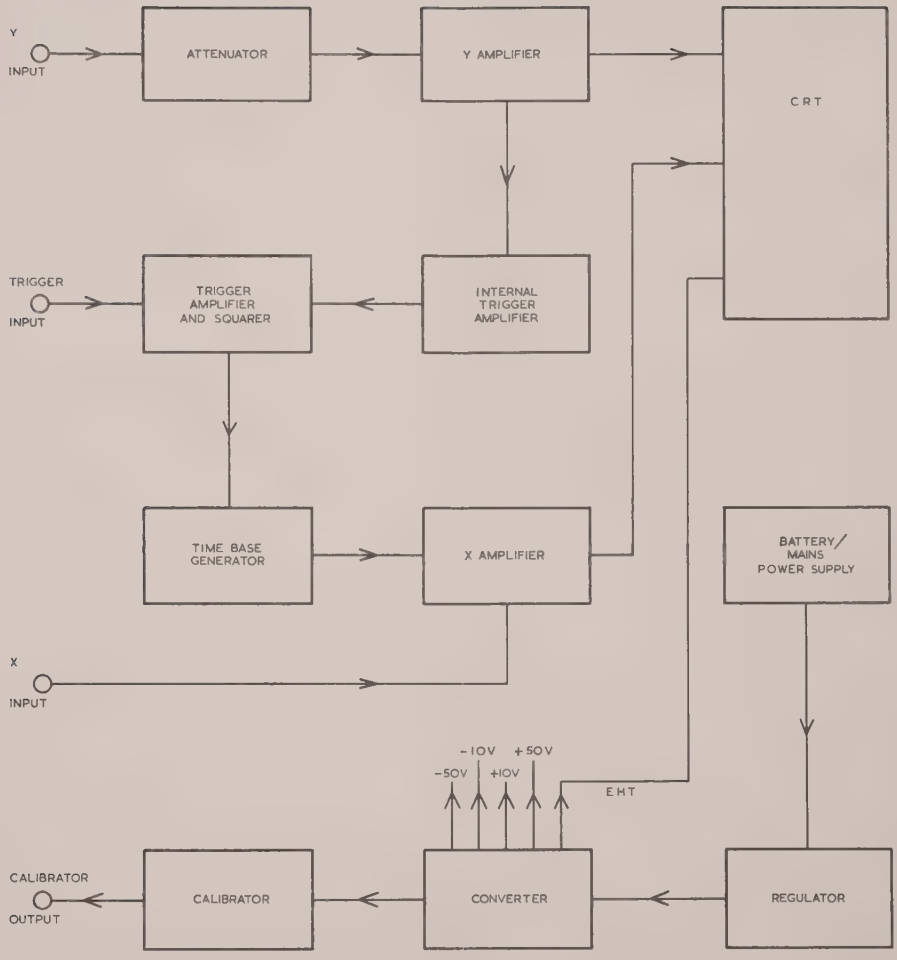
11. Alternatives

Cct. Ref.	Cossor Ref.	Value	Tolerance ± %	Rating
	Resistors			
R101	ITB3512/2HS2/500k/01	500k	1	.25W
R102	ITB3512/2HS2/1M/01	1M	1	.25W
R103	ITB3512/2HS2/750k/01	750k	1	.25W
R104	ITB3512/2HS2/333k/01	333k	1	.25W
R105	ITB3512/2HS2/900k/01	900k	1	.25W
R106	ITB3512/2HS2/111k/01	111k	1	.25W
R108	ITB3512/2HS2/990k/01	990k	1	.25W
R109	ITB3512/2HS2/10.1k/01	10.1k	1	.25W
R110	ITB3512/2HS2/1M/01	1M	1	.25W
R111	ITB3512/2HS2/1k/01	1k	1	.25W
R207	IUB3541/97	100k	5	1W
R220	ITB3505/C21/6.5k/01	6.5k	1	$\frac{1}{10}$W
R221	ITB3505/C21/180Ω/01	180Ω	1	$\frac{1}{10}$W
R605	ITB3552	15Ω	5	5W
R801	ITB3505/C21/5M/01	5M	1	.25W
R802	ITB3505/C21/2.5M/01	2.5M	1	.25W
R803	ITB3505/C21/1.5M/01	1.5M	1	.25W
R804	ITB3505/C21/500k/01	500k	1	.25W
R805	ITB3505/C21/250k/01	250k	1	.25W
	Diodes			
MR5	ITB9085/2 IN823			
MR506	IUB9089/2 IN922			
MR507	IUB9089/2 IS922			
MR509	IUB9089/2 IS922			
MR510	IUB9089/2 IS922			
MR608	ITB9085/2 IN823			
MR506	IUB9094 BAX16			
MR507	IUB9094 BAX16			
MR509	IUB9094 BAX16			
MR510	IUB9094 BAX16			
	Transistors			
VT203	ISB9086 MPS6518			
VT204	ISB9086 MPS6518			
VT601	IUB9088 U3180/3			
VT602	IUB9088 U3180/3			

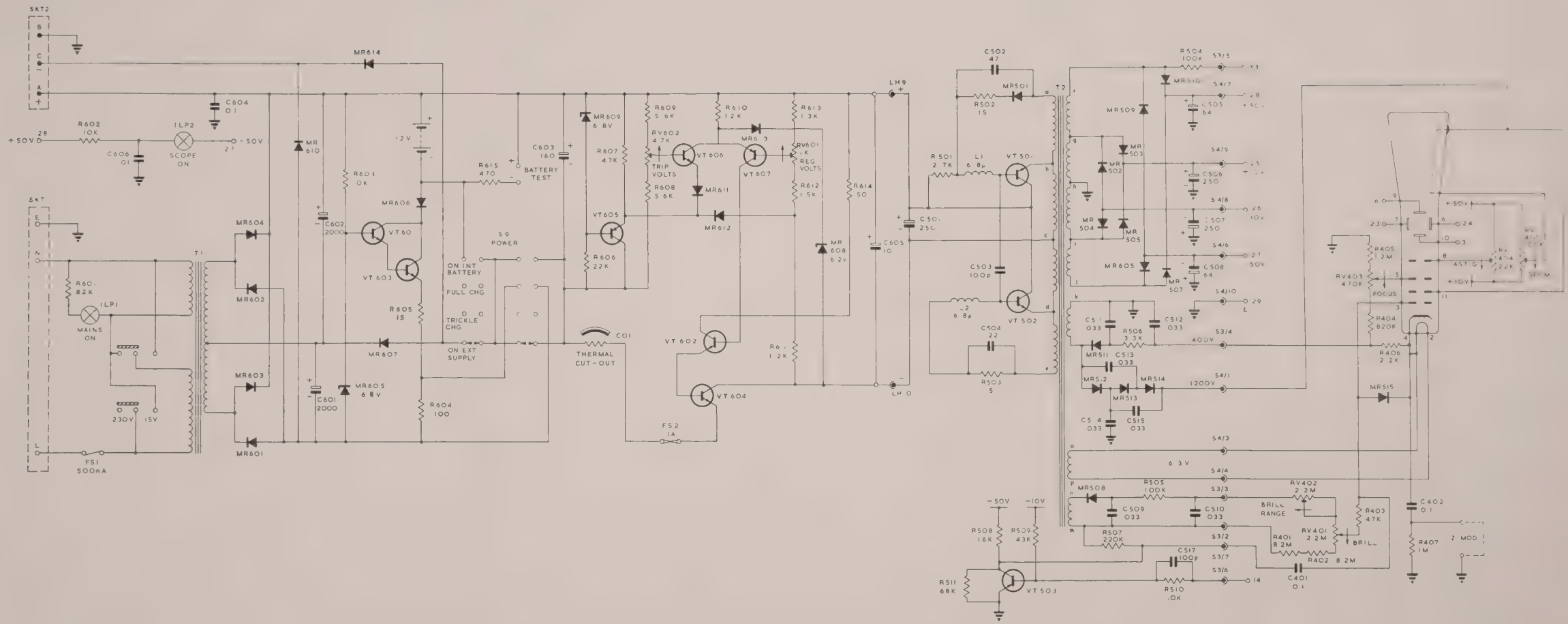
D/SA80439/6 Iss.E Sht.2
B/SA80439/32 Iss.B Sht.4
B/SA80439/34 Iss.F Sht.2
C/SA80439/37 Iss.C
C/SA80439/42 Iss.D

CDU 130 OSCILLOSCOPE - COMPONENT LIST

Cct. Ref.	Cossor Ref.		Value	Tolerance ± %	Rating
	Transistors				
VT605	ISB9086	MPS6518			
VT607	ISB9086	MPS6518			
VT703	IUB9026	SFT187			
VT704	IUB9026	SFT187			



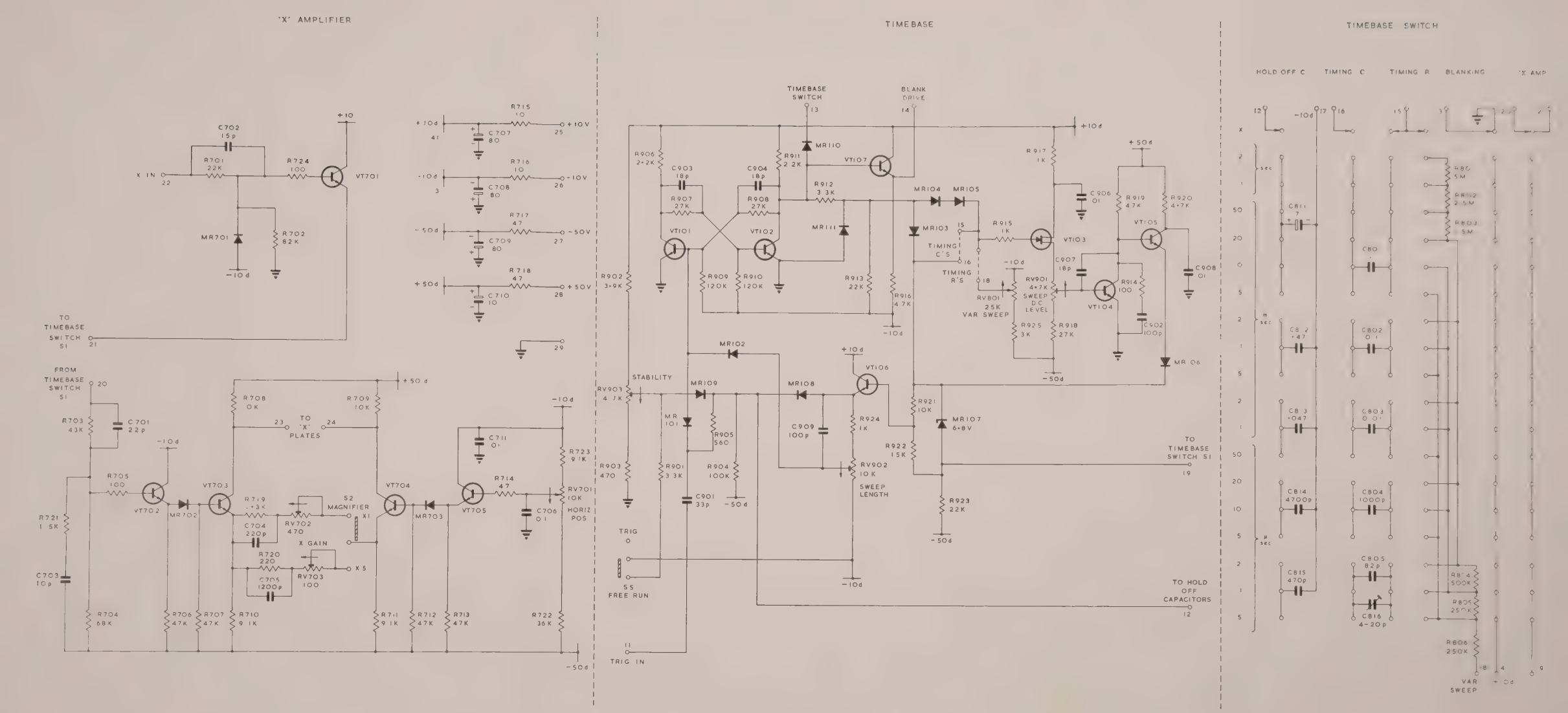
CDU 130 OSCILLOSCOPE – BLOCK DIAGRAM Fig. 1



CDU130 POWER AMPLIFIER - CONVERTOR - CRT.

FIG. 2.

E/CD 80439 SHT. 2 OF 3 ISS.F



CDU130 X-AMPLIFIER-TIMEBASE-TIMEBASE SWITCH

FIG. 3.

E/CD80439 SHT.3 OF 3 ISS.B

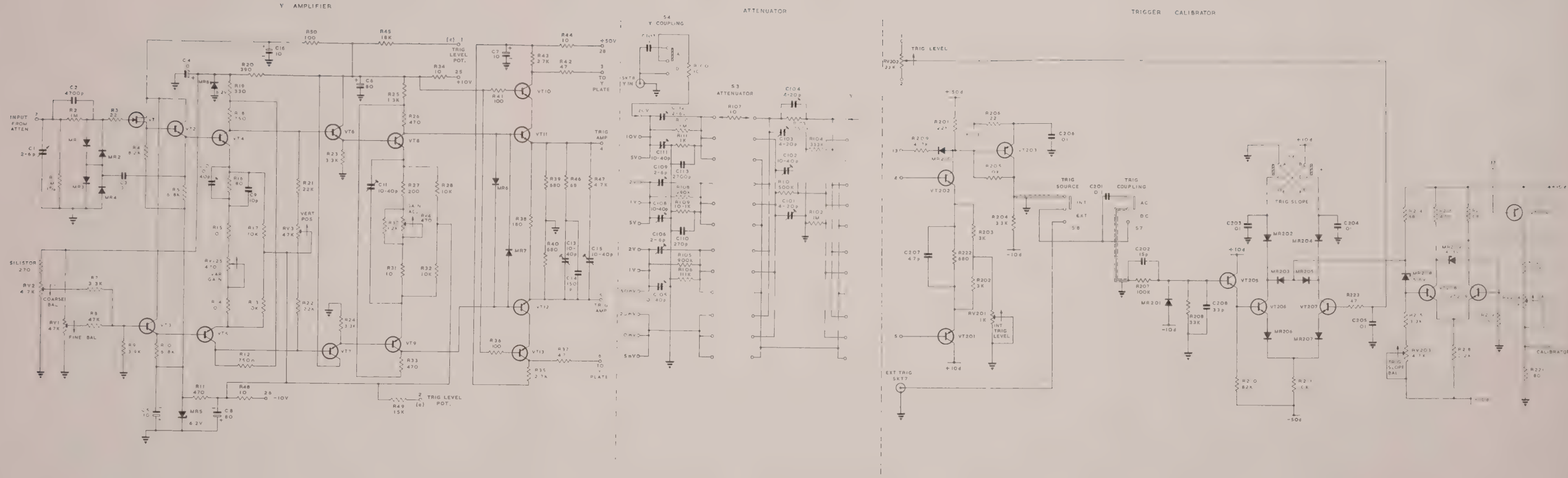
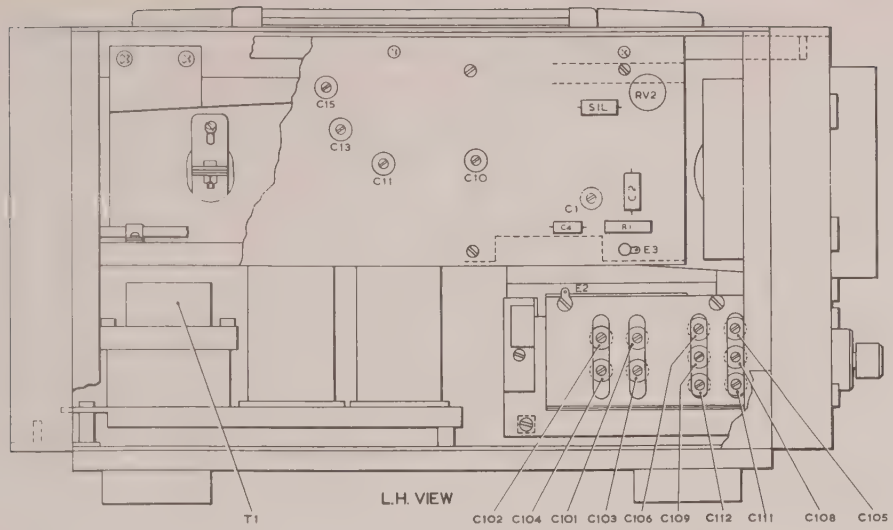


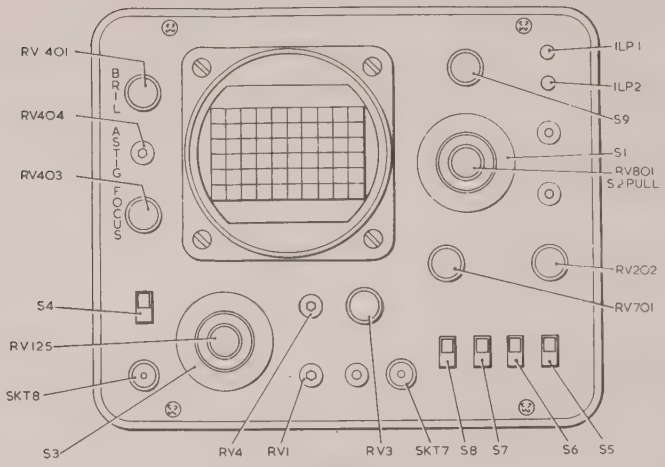
FIG. 4.
E/CD80439 SHT.1 OF3 ISS.B

CDU130 'Y' AMPLIFIER-ATTENUATOR-TRIGGER CALIBRATOR-CIRCUIT DIAGRAM

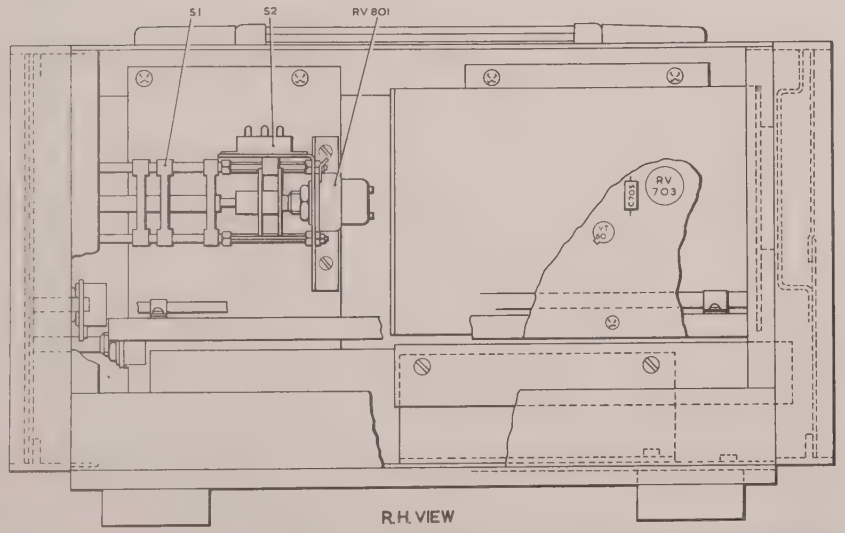
FIG.4.



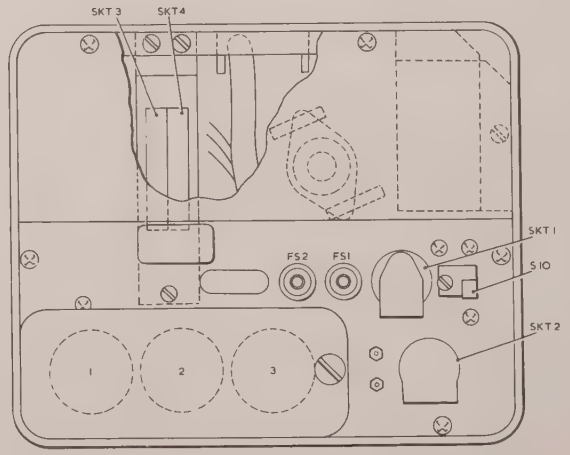
L.H. VIEW



FRONT VIEW



R.H. VIEW

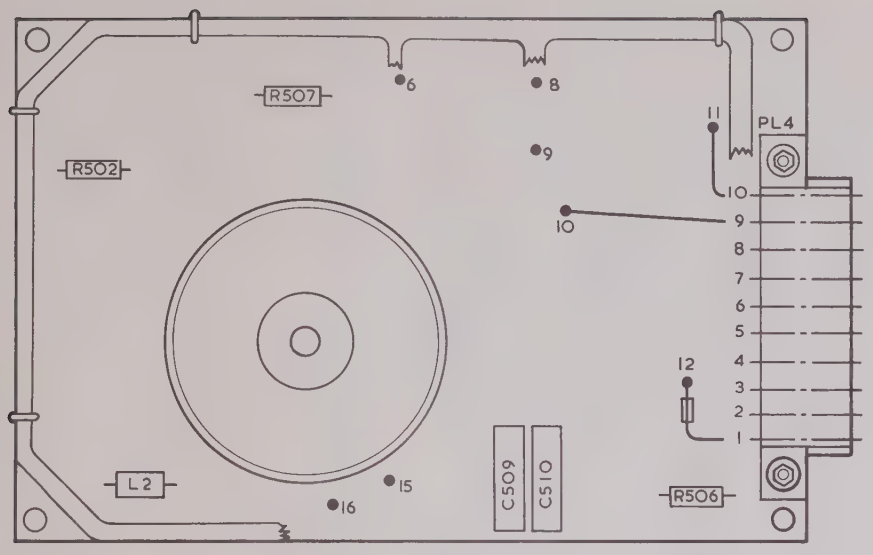


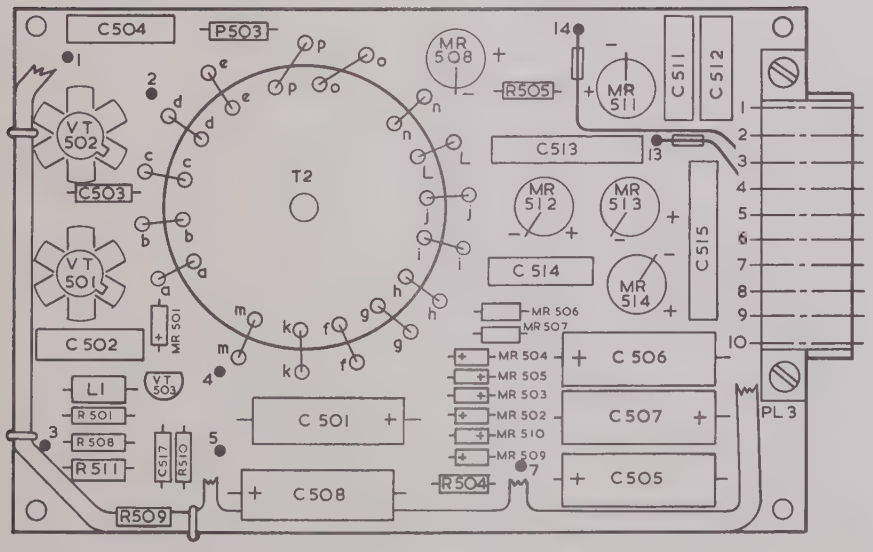
REAR VIEW

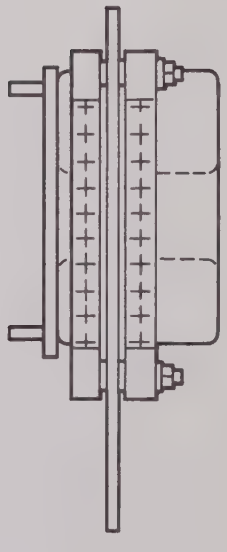
CDU130 OSCILLOSCOPE CDU 130 MAIN ASSEMBLY- COMPONENT LAYOUT

FIG. 5

D/GA 80439 SHT.1 OF 3 ISS. E

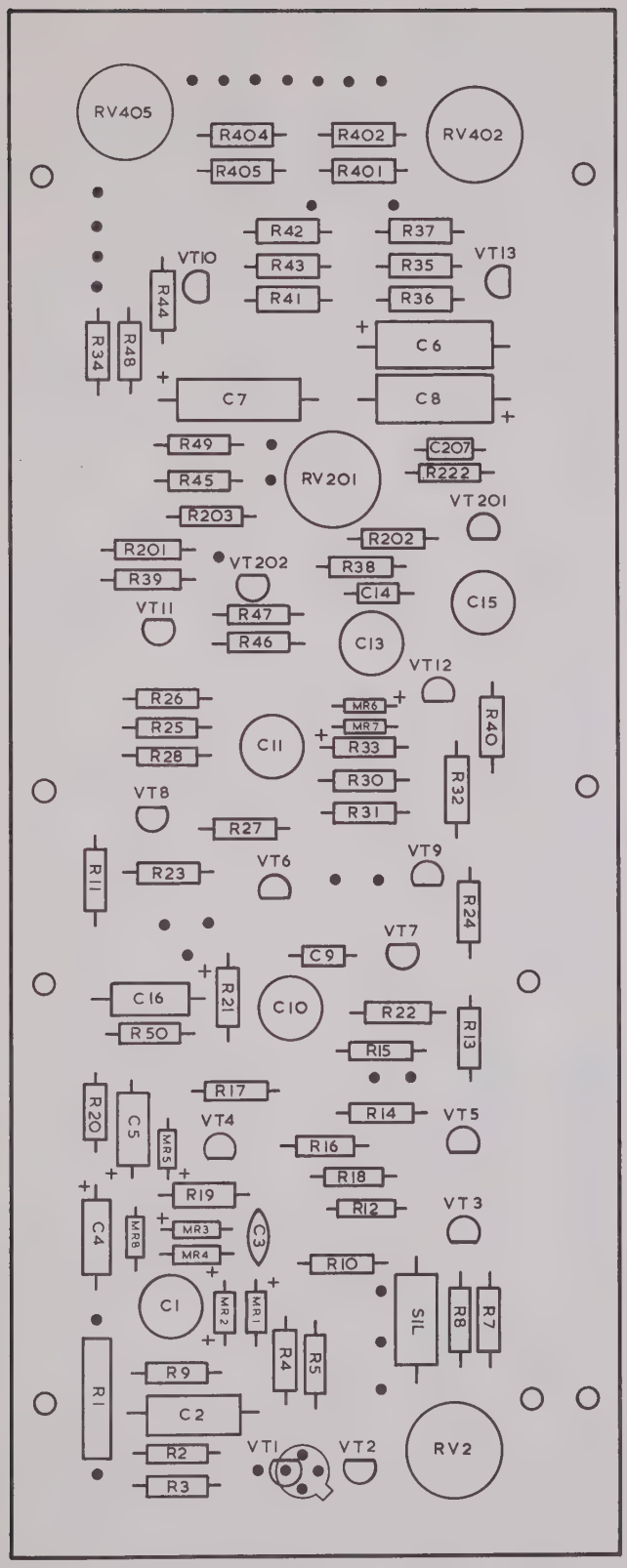




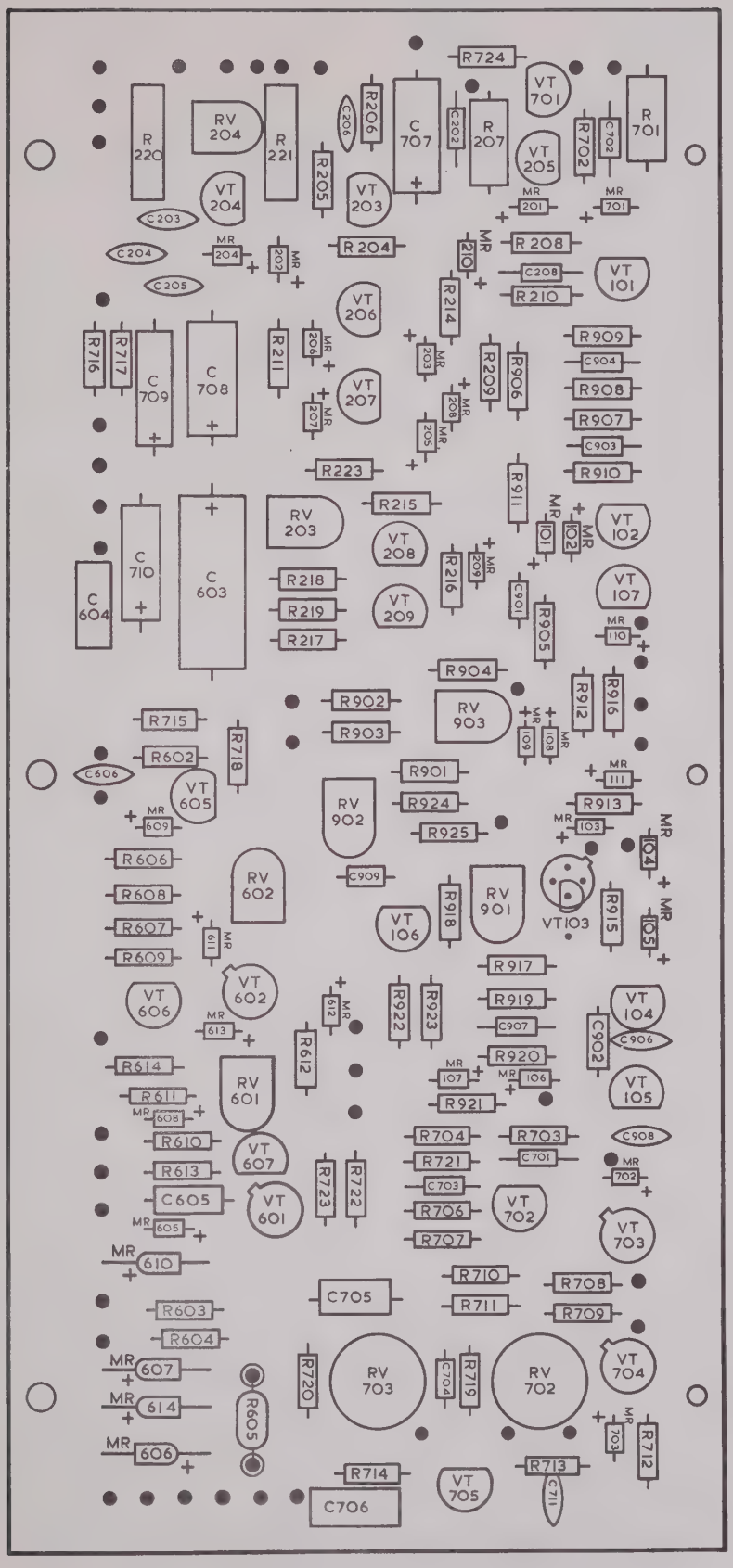


CDU130 CONVERTOR BOARD - COMPONENT LAYOUT Fig. 6

B/SA 80439/34 ISS.C

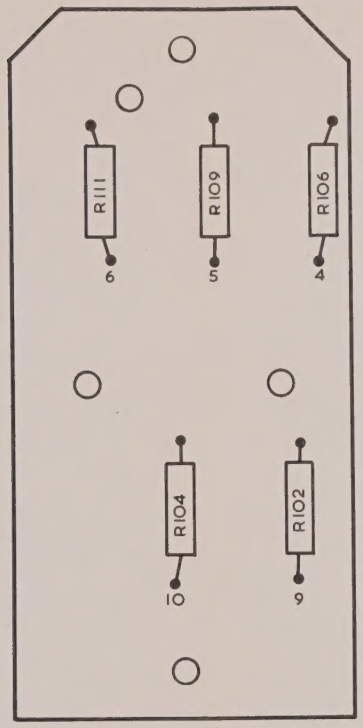


CDU130 AMPLIFIER BOARD - COMPONENT LAYOUT Fig. 7

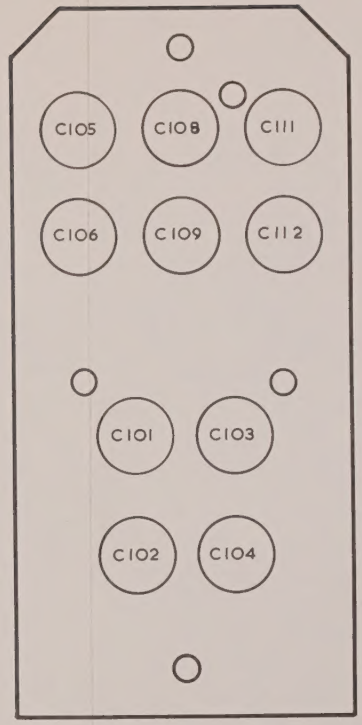


CDU130 TIMEBASE BOARD — COMPONENT LAYOUT Fig.8

B/SA 80439/32 ISS.C



SIDE OF BOARD CONTAINING
PRINTED CIRCUIT



REVERSE SIDE OF BOARD

CDU130 ATTENUATOR BOARD – COMPONENT LAYOUT Fig. 9

C/SA 80439/42 ISS.B

MP MASTER
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